

(3 Hours)

[Total Marks : 100

N.B. : (1) Question No.1 is compulsory.

(2) Answer any four questions from remaining six questions.

1. (a) What is kernel ? Describe briefly the approaches of designing kernel. 5
 (b) What is real time operating system ? Write the characteristics of real time operating system. 5
 (c) In typical process state transition diagram. Clearly state under what condition the following state transitions occurs ? 5
 (i) Running to ready
 (ii) Running to waiting
 (iii) Waiting to ready
 (d) What is Programmed I/O ? Describe in brief. 5
2. (a) Consider a system running 10 I/O bound tasks and one CPU bound task. Assume that I/O bound task issues an I/O operation once for every millisecond of CPU computing and that each I/O operation takes 10 milliseconds to complete. Also assume that the context switching overhead is 0.1 millisecond and that all processes are long running tasks. What is the CPU utilization for round Robin Scheduler when : 10
 (i) the time quantum is 1 millisecond
 (ii) the time quantum is 10 milliseconds ?
 (b) Describe the implementation of file allocation techniques. 10
3. (a) What is meant by interprocess communication ? Explain shared memory and message passing. 10
 (b) Consider the following page traces in demand paging system with 4 page frames :- 10
 2, 3, 1, 2, 4, 3, 2, 5, 3, 6, 7, 9, 3, 7.
 Determine the number of page faults and hit ratio using FIFO and LRU page replacement algorithms. 5
4. (a) Consider the following system snapshot using data structure in the Banker's algorithm. 10

Process	Max				Allocation				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	6	0	1	2	4	0	0	1	3	2	1	1
P1	1	7	5	0	1	1	0	0				
P2	2	3	5	6	1	2	5	4				
P3	1	6	5	3	0	6	3	3				
P4	1	6	5	6	0	2	1	2				

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Using Banker's algorithm, answer the following questions :-

- (i) How many resources to type A, B, C and D are there ?
- (ii) What are the contents of Need matrix ?
- (iii) Is the system is in safe state ? Find the safe sequence if it is.

(b) Draw and explain architecture of RTOs.

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5. (a) Suggest the implementation of binary semaphore that avoids the busy waiting. 10
- (b) A 16 bit computer has page size of 1024 bytes. The page table of process is as 10

Page No.	Frame No.
0	7
1	2
2	5
3	1
4	12
5	6
6	6
7	0

follows :

Determine the physical address corresponds to logical address.

- (i) 3720
- (ii) 1125

6. (a) On a disk with 1000 cylinders, number 0 to 999, compute the number of tracks the disk arm must move to satisfy all request in the disk queue. Assume the last request serviced was at track 345 and the head is moving towards track 0, the queue in FIFO order contains request for the following tracks : 10

123, 874, 692, 475, 105, 376

Perform the computation for following scheduling algorithm :-

- (i) FIFO
- (ii) SSTF
- (iii) SCAN.

- (b) What is thread ? Explain user level threads and kernel level threads.

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7. Write short notes on the following :-

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- (a) NOs.
- (b) Different types of schedulers.
- (c) Distributed O.S.
- (d) I-node.